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### RESEARCH ARTICLE

#### ALOE VERA – A TRADITIONAL MODERN MEDICINE.

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#### Abstract

*Aloe barbadensis* from Xanthorrhoeaceae is an ancient medicinal plant containing traditional and folk medicinal properties for several diseases. Various parts of *Aloe vera* plant have been in the field of Therapeutics, Cosmetics and Pharmaceuticals. *Aloe vera* comprises of 200 and more molecule types in it which are solely responsible for the release of phytochemicals. This species involved in the key actions of healing wounds and stimulates secretions of bile. *Aloe* is laxative. Out of the 22 amino acids required for the human body, 8 essential amino acids are found in *Aloe vera*. The external source vitamins namely A, B1, B2, B6, B12, C and E are predominantly available in *Aloe vera* itself. Despite of tremendous uses of *Aloe vera*, poor natural propagation by means of axillary shoots and the presence of male sterility becomes the major barriers in rapid propagation of *Aloe vera*. Large scale propagation can be standardized through Tissue culture where the yield is more and the produced plants are disease free. In this study, the review on *Aloe vera* was studied along with the development of the plant through tissue culture in order to increase productivity for making use of the applications.

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#### Introduction:-

The traditional names Barbados or Curaçao Aloe has been procured by *Aloe vera* (*Aloe barbadensis*) which is familiar across the world for thousands of years. *Aloe vera* is a boon to the country as it acts as a natural fighter against all sorts of infection, an anti-oxidant involved in treating all digestive problems [1]. The *Aloe vera* ingredients are said to cure heartburn, arthritis, stress, diabetes, rheumatism pain, asthma, cancer, AIDS. It is a laxative, beauty Enhancer. Research studies have proven the effect of *Aloe vera* in lowering blood sugar levels in diabetics. Apart from its leaves, the gel like pulp obtained by peeling its leaves has amazing properties. *Aloe* juice is anabolic which has cooling properties. The phytochemicals present in them guards against fever, skin diseases, burns, ulcers [3].

#### Traditional Medicine:-

The medicinal use of *Aloe* was already mentioned more than 4000 years ago. The leaves of *Aloe vera* may be flecked with white and are pale green or gray-green in color that produces a conspicuous inflorescence composed of

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densely packed pendulous yellow flowers on a spike which can be up to 90 cm (35 in) in height [2]. The plant can grow to a height of 3 feet and can live for up to 100 years if well cared for.

**Habitat:-**

Native to the mediterranean region of southern Europe and North Africa and to the Canary Islands. Commonly grown in Asia, southern Europe, southern USA, Mexico, Aruba, Bonaire, Bermuda, the Bahamas, West Indies, Central and South America [2]

**Key Actions:-**

*Aloe* is known for its medicinal properties, its use in cosmetics which is possible because of its parts such as leaves, gel and sac. The wound healing property of *Aloe* is due to its stimulation of secretions of bile juice. *Aloe* as a leaf which when dried and purified exhibit laxative effect. The *Aloe* leaves possess a gooey translucent gel within, known all over the world which possesses remarkable medicinal properties. The translucent gel is made up of around 96% water, some organic and inorganic compounds, a protein which contains 18 amino acids. The major part of the *Aloe vera* plant is the 'sap', a yellow-colored liquid stuck to the [skin](#) of the plant which is used for several applications. The processed gel exhibits its role in following products:

1. Drugs
2. Cosmetics
3. Soft drinks
4. Food
5. Preparations
6. Moisturizers
7. Healthcare products [4].

It is also found that out of the 22 amino acids required for the human body, 8 essential amino acids are found in *Aloe vera*. Vitamins namely A, B1, B2, B6, B12, C and E, which the human body cannot prepare by itself, are available in *Aloe vera*.

**Active Ingredients:-**

The ingredients in *Aloe* can be grouped as Vitamins, Minerals, Sugars, Enzymes, Lignins, Amino Acids, Anthraquinones, Saponins, Fatty Acids, Salicylic Acid. Fresh *Aloe* juice/gel from the inner leaf parenchyma contains 96% water, polysaccharides (mucilage) consisting mainly of D-glucose and D-mannose, tannins, steroids, enzymes, plant hormones, amino acids, vitamins, minerals, and a small amount of barbaloin. The superficial pericycle cells produces dried latex that contains at least 28% hydroxyanthracene, anhydrous barbaloin, which is a mixture of aloin A and aloin B, resin and saponins [5] [7].

**Useful Parts Leaves:-**

Fig 1:- *Aloe vera* leaves

The most important part of *Aloe* plant is their leaves which are usually succulent, thick and fleshy. The pale green surface of *Aloe vera* leaf is varied with small white dots; the lower leaf surface on the other hand is convex type [1]. Its leaf margins are slightly pinkish with triangular teeth. The inner part of the plant contains Polysaccharide,

Acemannan. Acemannan is a medicinal compound that functions both externally for soothing skin and internally for nutritional benefits. The gel inside leaf has an outer firm which contains *aloe-emodin*, a plant chemical involved in the defense mechanism of immune system [6].

*Aloe* juice/*Aloe* gel is the fresh viscous juice/gel from the parenchyma of the *Aloe* leaf. It is best to remove the gel by hand in order to avoid admixture of aloin from the pericycle cells located under the leaf epidermis. *Aloe* dried latex from the pericycle cells of *aloe vera* contain high aloin content [7].

#### **Useful Chemicals:-**

*Aloe vera* leaves when processed as juice consists of Aminoacids responsible for building the proteins and muscle tissues in the body. In addition, the presence of Anthraquinones was identified in *aloe* that includes the release of emodin, aloetic acid, and aloin, anthracene which reflects analgesic and antibacterial properties. It contains various enzymes responsible for fighting against several fungi and viruses. Apart from their medicinal uses, *aloe vera* is also responsible for the release of plant growth hormones such as Auxins and Gibberellins which helps in the plant growth as well as heals wounds and inflammations [6]. It consists of various Vitamins such as A, B, C, E, Choline, B12, Folic acid as an antioxidant and neutralizes free radicals, thus eliminating the diseases. Saponin content in leaves can be used as an antiseptic and for cleansing. Sugars in the *Aloe vera* act as antiviral agent and involves in the defense mechanism of immune system [6].

#### **Pharmacological Actions of Aloe:-**

*Aloe* as discussed contains an enormous nutritional property.

#### **Anti-microbial Property:-**

Today, Bacteria have gained resistance to antibiotics which is becoming a serious concern to public health. Herbal medications on the other hand, have created awareness in particular because of the belief of lower incidence of adverse reactions after math of the medications taken using plants compared to synthetic pharmaceuticals [3]. The gel extracted from *Aloe vera* leaf has proved to inhibit the growth of the Gram-positive bacteria such as *Shigella flexneri* and *Streptococcus progenes*. Apart from this, specific plant compounds such as anthraquinones and dihydroxyanthraquinones as well as saponins as a phytochemical have been found to perform direct attack on the microbes in the body and provide immunity. The Indirect attack has been done on microbes by Acemannan, a polysaccharide which stimulates phagocytic leukocytes in the immune system and provides defense mechanism. Many Research studies have reported the effect of the anthraquinone *aloe emodin* against the bacteria [4].

#### **Antioxidant Property:-**

*Aloe vera* is known for the possession of powerful antioxidant nutrients. Antioxidant property in *Aloe vera* was proven by several effects such as Glutathione peroxide activity, superoxide dismutase enzymes, and a phenolic antioxidant present in *Aloe vera* gel. Presence of A, C, and E vitamins act as free radical components that help in getting rid of the toxins and carcinogenic properties as a result of pollution and bad food habits [4].

#### **Antitumor Property:-**

The presence of 2 types of compounds namely glycoproteins (lectins) and polysaccharides in *Aloe vera* prove the anti-tumor effects. Studies indicated antitumor activity in terms of reduced tumor burden, tumor shrinkage, tumor necrosis, and prolonged survival rates with respect to the consumption of *Aloe vera* gel. Glutathione S-transferase induction by *Aloe* and an inhibition of the tumor-promoting effect of phorbol myristic acetate suggested *Aloe* gel in cancer chemoprevention [7].

#### **Anti-Inflammatory Property:-**

*Aloe* is responsible for the inhibition of cyclooxygenase pathway which can decrease prostaglandin E2 activity [1]. Research studies revealed the novel anti-inflammatory compound called C-glucosyl chromone was isolated from gel extracts of *Aloe vera*. Also, bradykinin, an inflammatory substance inducing pain can be efficiently broken down by the induction of peptidase brady kinase secreted by *Aloe* [2].

#### **Wound-Healing property:-**

Inflammation is the quick action of all wounds which decreases the migration effect of epithelial cells. This *Aloe* gel is involved in the wound-healing effects and results in keeping the wound moist simultaneously increasing epithelial cell migration which causes collagen maturation and finally reduces the inflammation. [7]

**Aloe Composition:-**

As per the Research studies, Aloe consists of various nutrients, enzymes, phytochemicals minerals and aminoacids as active ingredients which have attempted to relate specific biological effects [5].

**Vitamins:-**

Aloe possesses A, B1, B2, B3, B6, B12, chloine and folic acid responsible for supplying energy and strengthens the immune system. This is the natural source of vitamin production being done for the sake for fitness in health and well-being [5].

**Minerals:-**

Minerals such as calcium, potassium and Iron are the building blocks necessary for the growth of bones, teeth and human metabolism [3].

**Aminoacids:-**

Essential and Non-essential amino acids such as Alanine, arginine, aspartic acid, glutamic acid, glycine, histidine, hydroxyproline, isoleucine, leucine, lysine, methionine, phenylalanine, proline, threonine, tyrosine, valine are abundantly available in *Aloe* which is a natural means. These aminoacids outsourced or produced in the body are involved in several responsibilities such as repairing the tissues; carrying oxygen throughout the body. They also help in the formation of antibodies to fight against bacteria and fungi which can be easily fulfilled by its constant production through *Aloe vera* [6].

**Enzymatic Activity:-**

*Aloe* are involved in the secretion of various enzymes such as Alkaline phosphatase, amylase, carboxypeptidase, catalase, bradykinase, cyclooxygenase, peroxidase, carboxypeptidase, cyclooxygenase, lipase, oxidase, phosphoenolpyruvate carboxylase, superoxide dismutase that primarily dedicated for the intestinal activity and in the assistance of breaking down of food elements [7].



**Fig 2:-** *Aloe vera* plant.

**Folk Medicine:-**

There is considerable use of *A. barbadensis* in folk medicine in the southernmost United States. The phytochemical analysis of the various parts of the *Aloe vera* plants such as stem, leaves/juice extract has been done for the confirmation of the phytochemicals in them which proves the ability of *Aloe vera* to participate in defense mechanisms by isolating the specific phytochemicals for the specific targeted organisms. In addition, the antioxidant activity and the antimicrobial activity tests were done in order to prove the medicinal property of *Aloe vera*. [8].

Rheumatoid arthritis (RA) is a debilitating disease affecting millions of people throughout the world and is more present in elderly people. The disease affects mobility and as such the affected population has to suffer both physically with possible concomitant mental depression. Since plants have always proved to be a rich source of drugs, they may prove a useful source of newer drugs against RA. Indeed, some of the discussed phytochemicals present in *Aloe barbadensis* can provide relief to RA patients through promoting wound healing, as well as reducing inflammation and relieving pain, which are common symptoms of RA affected patients [9].

**Toxicology:-**

Usually, all the dried latex from the superficial pericycle cells has the side effects as other peristalsis stimulating laxatives, but *Aloe* has a more drastic and irritant action. It is proven that *Aloe* is contra-indicated during pregnancy, menstruation and hemorrhoids due to hyperemia of the pelvic organs. An overdose may cause severe abdominal pain, bleeding gastritis and inflammation of the kidneys. However, the fresh aloe juice/gel normally does not give any side effects. Occasionally the local application of aloe gel may cause an acute skin rash, which usually soon disappears with continued use [1].

**The Edible Aloe:-**

Apart from their Medicinal and Nutritional values, the leaves of Aloe are used as a vegetable where the tender leaves are used for the preparation of Pickle which is a common dish in western Rajasthan. The immature flower stalk of aloe is found to be completely free from bitter content which is perfect for the use as vegetable. Fresh fleshy leaf pad also belongs to a part of green salad and treats indigestion and constipation. It helps to cure diabetes, ulcer, and heart disease [8]. *Aloe vera* juice enhances immune response against various diseases. Moreover, *Aloe vera* leaf powder is also being used in the food processing industries for the preparation of yoghurt and other food products. Yet, the gel is most commonly used part of the plant which has been processed and used in different products and available in the form of juice as well [9].

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